Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

July 21, 2014

10 CFR 50.73

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Unit 2
Renewed Facility Operating License No. DPR-52
NRC Docket No. 50-260

Subject: **Licensee Event Report 50-260/2014-003-00**

The enclosed Licensee Event Report provides details of the inoperability of Browns Ferry Nuclear Plant's, Unit 2, Standby Liquid Control System. The Tennessee Valley Authority (TVA) is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(v)(A), (C) and (D), as any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to shut down the reactor and maintain it in a safe shutdown condition, control the release of radioactive material, or mitigate the consequences of an accident.

There are no new regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact J. L. Paul, Nuclear Site Licensing Manager, at (256) 729-2636.

Respectfully,

K. J. Polson
Site Vice President

Enclosure: Licensee Event Report 50-260/2014-003-00 – Both Trains of Standby Liquid Control Inoperable

cc (w/ Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

IE22
NRR

JLP:MBA:CSP
Enclosure
bcc (w/ Enclosure):

NRC Project Manager - Browns Ferry Nuclear Plant

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ENCLOSURE

Browns Ferry Nuclear Plant
Unit 2

Licensee Event Report 50-260/2014-003-00

Both Trains of Standby Liquid Control Inoperable

See Enclosed

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Browns Ferry Nuclear Plant, Unit 2	05000260	1 of 7

4. TITLE: Both Trains of Standby Liquid Control Inoperable

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
05	21	2014	2014	- 003 -	00	07	21	2014	FACILITY NAME N/A	DOCKET NUMBER 05000

9. OPERATING MODE: 1

10. POWER LEVEL: 100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Mark Acker, Licensing Engineer	256-729-7533

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO		N/A	N/A	N/A

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On May 21, 2014, at 1721 Central Daylight Time, Browns Ferry Nuclear Plant (BFN), Unit 2, declared both trains of Standby Liquid Control (SLC) inoperable due to suspected in-leakage to the BFN, Unit 2, SLC tank. Chemistry personnel were dispatched to check the tank level locally after the Control Room received a high level alarm and reported that tank level was high and rising. Based on this report, the SLC system was rendered inoperable and unavailable by closing the SLC tank isolation valve common to both pumps to prevent overflowing the tank. It was subsequently determined that the sensing line had become clogged causing erroneous level indication and the local report of level was incorrect. Sensing lines for the tank level instrumentation were cleared and Operability was restored by returning the isolation valve to the open position and verifying tank level was normal.

The cause of the event was the inadequate use of human performance tools by chemistry personnel which led to the incorrect reporting of SLC tank level when an unexpected condition was encountered.

The corrective actions to reduce recurrence are to revise the surveillance for checking SLC solution level to include a caution note stating that an accurate tank level stick reading cannot be obtained when excessive bubbling is observed in the tank and to increase the frequency of mechanical cleaning of the SLC level indication sensing line. In addition, the responsible Chemistry technician was coached on the appropriate use of human performance tools.

NARRATIVE

I. Plant Operating Conditions Before the Event

Browns Ferry Nuclear Plant (BFN), Unit 2, was in Mode 1 at approximately 100 percent power.

II. Description of Events

A. Event:

On May 21, 2014, at 1550 Central Daylight Time (CDT), Browns Ferry Nuclear Plant (BFN), Unit 2, Control Room Operators received an alarm for abnormal Standby Liquid Control (SLC) [BR] tank [TK] level and corresponding high level on the control room indicator. Personnel were dispatched to check the tank level locally and reported that tank level was high and rising. Based on this report, on May 21, 2014, at 1721 CDT, the SLC system was declared inoperable and BFN, Unit 2, Technical Specification (TS) Limiting Condition for Operation (LCO) 3.1.7, Standby Liquid Control (SLC) System, Condition B, was entered. On May 21, 2014, at 1746 CDT, the BFN, Unit 2, SLC system was rendered unavailable by closing the SLC tank isolation valve [ISV] common to both pumps to prevent the potential for overflowing the tank.

The BFN, Unit 2, TS LCO 3.1.7, requires two SLC subsystems to be Operable, during Modes 1, 2, and 3. With both BFN, Unit 2, SLC systems inoperable, TS 3.1.7 Required Action B.1 requires one SLC subsystem to be returned to Operable status within eight hours.

The safety objective of the SLC system is to provide a backup method, which is independent of the control rods, to make the reactor [RCT] subcritical over its full range of operating conditions and provide sufficient buffering agent to maintain the suppression pool pH at or above 7.0 following a design basis Loss of Coolant Accident (LOCA) involving fuel damage. Making the reactor subcritical is essential to permit the nuclear system to cool to the point where corrective actions can be carried out. The safety objective is achieved by injecting a sodium pentaborate solution into the reactor.

The SLC system consists of a single boron solution tank and two independent trains used for solution injection into the reactor. Because both trains of the SLC system were isolated by closing the SLC tank isolation valve, the SLC system was unable to perform its safety function to shut down the reactor and maintain it in a safe shutdown condition, control the release of radioactive material, and mitigate the consequences of an accident for BFN, Unit 2.

NARRATIVE

B. Status of structures, components, or systems that were inoperable at the start of the event and that contributed to the event:

There were no structures, components, or systems that were inoperable at the start of the event and that contributed to the event.

C. Dates and approximate times of occurrences:

May 21, 2014, at 1550 CDT	BFN, Unit 2, Operators received the SLC Tank Level Abnormal alarm. Control Room and local indications showed the SLC tank level to be 95.5 percent and rising. Operations notified Chemistry and requested performance of the surveillance for measuring SLC solution level.
May 21, 2014, at 1720 CDT	During the performance of the SLC solution level measurement surveillance, a Chemistry technician measured the tank level to be greater than 100 percent with the liquid level near the top of the tank and a continuous stream of dime sized bubbles in the solution.
May 21, 2014, at 1721 CDT	Operations declared the BFN, Unit 2, SLC system inoperable and entered TS LCO 3.1.7.B.
May 21, 2014, at 1746 CDT	Operations closed the SLC tank isolation valve common to both pumps to prevent additional in-leakage and the potential for overflowing the tank.
May 21, 2014, at 1808 CDT	The condition was corrected, the SLC isolation valve was opened, and Operations declared the BFN, Unit 2, SLC system Operable.

D. Manufacturer and model number (or other identification) of each component that failed during the event:

No component failures were identified that occurred during the event.

E. Other systems or secondary functions affected:

There were no other systems or secondary systems affected.

NARRATIVE

F. Method of discovery of each component or system failure or procedural error:

On May 21, 2014, at 1550 CDT, BFN, Unit 2, Operators received the SLC Tank Level Abnormal alarm. Control Room and local indications showed the SLC tank level to be 95.5 percent and rising.

G. The failure mode, mechanism, and effect of each failed component, if known:

There were no failed components related to this event; however, the SLC level indication sensing line became clogged with sodium pentaborate crystals causing erroneous level indication.

H. Operator actions:

Operations notified Chemistry of the SLC Tank Level Abnormal alarm in the Control Room and requested performance of the surveillance for measuring SLC solution level. After Chemistry reported that the SLC tank level was high, Operations declared the BFN, Unit 2, SLC system inoperable and closed the SLC tank isolation valve common to both pumps to prevent additional in-leakage and the potential for overflowing the tank. Operators cleared the SLC level indication sensing line and level indication returned to 89 percent. Operations opened the SLC isolation valve declared the BFN, Unit 2, SLC system Operable.

I. Automatically and manually initiated safety system responses:

There were no automatic or manual safety system responses associated with this event.

III. Cause of the event

A. The cause of each component or system failure or personnel error, if known:

This event is the result of the inadequate use of human performance tools by Chemistry personnel which led to the incorrect reporting of SLC tank level when an unexpected condition was encountered.

Human error prevention techniques, such as self and peer checking should have been used commensurate with the risk and scope of the assigned task. Personnel should not have proceeded in the face of uncertain or unexpected conditions. Human error resulted in clogged SLC sensing line condition becoming consequential.

B. The cause(s) and circumstances for each human performance related root cause:

During the performance of the surveillance for measuring SLC solution level, human error prevention techniques, such as self and peer checking should have been used commensurate with the risk and scope of the assigned task; however, these human error prevention techniques are not prescribed in the surveillance and only one chemistry technician is required to perform the activity.

The observation of dime sized bubbles in the tank and appearance of a rising level was not a previously documented expected condition during task performance.

NARRATIVE

Personnel should not have proceeded in the face of uncertain or unexpected conditions.

IV. Analysis of the event:

The Tennessee Valley Authority (TVA) is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(v)(A), (C) and (D), as any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to shut down the reactor and maintain it in a safe shutdown condition, control the release of radioactive material, or mitigate the consequences of an accident.

On May 21, 2014, at 1721 CDT, BFN, Unit 2, declared both trains of SLC inoperable due to suspected in-leakage to the BFN, Unit 2, SLC tank. Personnel were dispatched to check the tank level locally after the Control Room received a high level alarm and reported that tank level was high and rising. Based on this report, the SLC system was declared inoperable and rendered unavailable by closing the SLC tank isolation valve common to both pumps to prevent overflowing the tank. It was subsequently determined that the sensing line had become clogged by sodium pentaborate crystals causing erroneous level indication and the local report of level was incorrect. Sensing lines for the tank level instrumentation were cleared and Operability was restored by returning the isolation valve to the open position and verifying tank level was normal.

The cause of this event was determined to be the result of the inadequate use of human performance tools which led to the incorrect reporting of SLC tank level when an unexpected condition was encountered. The failure to accurately determine the solution level in the SLC tank resulted in Operations isolating both trains of the BFN, Unit 2, SLC system.

During the performance of the surveillance for measuring SLC solution level, human error prevention techniques, such as self and peer checking should have been used commensurate with the risk and scope of the assigned task; however, these human error prevention techniques are not prescribed in the surveillance and only one chemistry technician is required to perform the activity.

The observation of dime sized bubbles in the tank and appearance of a rising level was not a previously documented expected condition during task performance. Personnel should not have proceeded in the face of uncertain or unexpected conditions.

V. Assessment of Safety Consequences

This event resulted in inoperability and unavailability of both trains of the BFN, Unit 2, SLC system resulting in the inability of the SLC system to perform its safety function to shut down the reactor and maintain it in a safe shutdown condition, control the release of radioactive material, and mitigate the consequences of an accident. However, a probabilistic risk assessment determined the cumulative risk for this event to be low.

Based on the discussion above, the safety significance of this event is minimal and the event did not pose a threat to the health and safety of the public or plant personnel.

NARRATIVE

A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event:

During this event normal means of reactivity control were maintained.

B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident:

This event did not occur when the reactor was shut down.

C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from discovery of the failure until the train was returned to service:

This event resulted in inoperability of the BFN, Unit 2, SLC system for approximately 47 minutes.

VI. Corrective Actions

Corrective Actions are being managed by TVA's corrective action program under Problem Evaluation Report (PER) 890649.

Immediate Corrective Actions

Operations declared the BFN, Unit 2, SLC system inoperable and closed the SLC tank isolation valve common to both pumps to prevent additional in-leakage and the potential for overflowing the tank. Operators cleared the SLC level indication sensing line and level indication returned to normal. Operations opened the SLC isolation valve declared the BFN, Unit 2, SLC system Operable.

Corrective Actions Reduce Probability of Similar Events Occurring in the Future

The corrective actions to reduce recurrence are to revise the surveillance for checking SLC solution level to include a caution note that an accurate tank level stick reading cannot be obtained when excessive bubbling is observed in the tank and that a peer check is required in this case and to increase the frequency of mechanical cleaning of the SLC level indication sensing line. In addition, the responsible Chemistry technician was coached on the appropriate use of human performance tools.

VII. Additional Information:

A. Previous similar events at the same plant:

A search of BFN LERs for Units 1, 2, and 3, for approximately the past three years did not identify any similar events.

A search of the BFN Corrective Action Program over the past three years identified similar PER 515133. In this event the SLC tank level indication increased from 88 percent to 93 percent in four hours. The SLC tank level was measured locally and it was determined that the tank level had not increased. To correct the condition a work order was generated and executed to clear the sensing line.

NARRATIVE

B. Additional Information:

There is no additional information.

C. Safety System Functional Failure Consideration:

This event resulted in the inability of the BFN, Unit 2, SLC system to perform its safety function to shut down the reactor and maintain it in a safe shutdown condition, control the release of radioactive material, and mitigate the consequences of an accident. In accordance with Nuclear Energy Institute (NEI) NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," this event is considered a safety system functional failure.

D. Scram with Complications Consideration:

This event did not result in a reactor scram.

VIII. COMMITMENTS

There are no commitments.